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EFFICACY OF CERTAIN INSECTICIDES AGAINST SHOOT AND FRUIT BORER (*LEUCINODES ORBONALIS* GUNE.) ON *KHARIF* SEASON BRINJAL (*SOLANUM MELONGENA* L.) UNDER FIELD CONDITION

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ABSTRACT

The present investigation was conducted during July to December 2014 at Central Research Farm, SHIATS, Naini, Allahabad. Three applications of seven insecticides viz; flubendiamide 39.35 SC (0.01%), chlorantraniliprole 20 SC (0.006%), cypermethrin 25 EC (0.006%), Spinosad 45 SC (0.01%), indoxacarb 14.5 SC (0.01%), fipronil 5 SC (0.005%) and imidacloprid 17.8 SL (0.004%) were evaluated against shoot and fruit borer, Leucinodes orbonalis. Minimum per cent of shoot infestation, fruit infestation and B:C ratio were recorded in chlorantraniliprole with (2.98%, 3.266% and 1:5.48) followed by flubendiamide (3.06%, 3.560% and 1:4.91) < spinosad (4.59%, 4.103% and 1:.4.65) < indoxacarb (4.80%,4.266%, and 1:4.44) < cypermethrin (5.97%, 4.870%, and 1:4.24) fipronil (8.61%, 6.44% and 1:3.66) < imidacloprid (8.63%, 6.73% and 1:3.39) < untreated control (water spray) (11.616%, 11.59% and 1:2.25) respectively.

KEYWORDS: Brinjal Shoot and Fruit Borer, Leucinodes orbonalis, Benefit Cost Ratio, Incidence, Insecticides

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Original Article

INTRODUCTION

Brinjal or egg plant or Aubergine (*Solanum melongena* L) has been cultivated in the country for the last 4000 years. It is widely grown in the warmer regions hemispheres, although it is often as a Mediterranean or mid-Eastern vegetable. Eggplant is a versatile vegetable. Among the solanaceous vegetables, brinjal is the one of the most popular and economically important vegetables among small-scale farmers and it is a source of cash income for resource-poor farmers. India is the second largest producer of vegetable with 10563000 tones production after China with production 24501936 tones in 2010. The existing area under vegetable cultivation in India is around 4.5 million ha. Majority of Indians are vegetarian, with a per capita consumption 135 g per day as against the recommended 300 g per day. It is still very less than recommended diet level **(Dhandapani *et.al.* 2003).**

Like any other crops, brinjal is also attacked by a number of insect pests at various stages of its growth, which affects the cultivation of brinjal and act as a limiting factor in the profitable cultivation of brinjal crop. The crop is attacked by about 140 species of insect and non insect pests belonging to 50 families**.** Out of which numerous insect pests *viz.* shoot and fruit borer, (*Leucinodes orbonalis* Guenee), leaf hopper *(Amrasca biguttula bigttula),* aphid *(Aphid gossypii),* Hadda beetle *(Epilachna spp.)* and brinjal stem borer (*Euzophera particrlla* Rag) have been reported as important pests of the brinjal by (**Butani and Jotwani 1984).**

Among these brinjal shoot and fruit borer, *Leucinodes orbonalis* Guenee. is the most destructive and the major limiting factor in quantative as well as qualitative harvest of brinjal fruits. Eggplant fruit and shoot borer (EFSB) was first described as *Leucinodes orbonalis* by Guenée. in 1854. There are no known synonyms of *L. orbonalis*, but several other species of *Leucinodes* have been described. This insect belongs to family Pyralidae of the insect order Lepidoptera. This pest is widely distributed in Malaysia, Myanmar, Srilanka, India, Pakistan, Germany and East Africa (**Atwal and Dhaliwal 2005).**

METHODS AND MATERIALS

The present investigation was undertaken at the central Research Farm of "Sam Higginbottom Institute of Agriculture, Technology and Sciences" Allahabad, Uttar Pradesh during Kharif season 2014. The research farm was situated on the right side of Allahabad Rewa road at 20 degree and 15^0 North, 60^0 east longitude city and is about 129.2 cm above sea level. The site was selected uniform, cultivable with typical sandy loam soil having good drainage.

Preparation of Insecticidal Spray Solution

The insecticidal spray solution of desired concentration as per treatments was freshly prepared every time at the site of experiment just before the start of spraying operations. The quantity of spray materials required for crop was gradually increased as the crop advanced in age.

The spray solution of desired concentration was prepared by adoption the following formula:

$$V = \frac{C \times A}{a.i.\%}$$

Where,

V= Volume of a formulated pesticide required.

C= Concentration required.

A= Volume of total solution to be prepared.

% a.i. = given Percentage strength of a formulated pesticide.

Efficacy of Treatments: The population of *Leucinodes orbonalis* was recorded before 1 day spraying and on 7^{th} day and 14^{th} day after insecticidal application. The population of shoot and fruit borer had been recorded from 5 plants, randomly selected and tagged from each plot.

Percent shoot infestation

Observations were recorded on the number of infested shoots in each plot a day before spray 7^{th} and 14^{th} days after spraying on selected plants in a plot. The per cent shoot damage was worked syntax using the formula (Number basis).

$$\text{Percent shoot damage (\%)} = \frac{\text{Number of infested shoots}}{\text{Total number of shoots}} \times 100$$

Percent Fruit Infestation

Observations were recorded on the number of infested fruits and total number of marketable fruits on selected plants in a plot picking wise. The per cent fruit damage was worked out by using the formula (Number basis),

$$\text{Percent fruit damage (\%)} = \frac{\text{Number of damaged fruits}}{\text{Total number of fruits}} \times 100$$

RESULTS AND DISCUSSIONS

All the treatments were found to be significantly superior to control in reducing percent shoot and fruit infestation. The minimum shoot and fruit infestations were recorded in chlorantraniliprole 20 EC from 2.77% to 4.97%. These results were similar to the findings reported by Mishra (2011). Flubendiamide 39.35 EC was found to be next effective treatment and its results were supported by Mahata *et al.,* (2014). Spinosad 45 SC was found to be next best and it was at par with flubendiamide. The results of spinosad 45 SC were supported by Tayde and Simon *(*2010). However, Imidacloprid was found less effective in reducing shoot and fruit damage. The present investigation supports the observation of Tiwari *et al*. (2011). The most effective treatment was chlorantraniliprole, flubendiamide and spinosad.

Table 1: Efficacy of Certain Chemical Insecticides against Shoot and Fruit Borer (Leucinodes Orbonalis) on Brinjal Shoot

Treatments		Ist Spray	11nd Spray	Mean
T_0	Untreated/water spray	20.38	36.63	28.505
		(26.73)*	**(37.23)***	**(32.047)***
T_1	Flubendiamide	7.066	3.30	5.183
		(15.40)*	**(10.47)***	**(12.940)***
T_2	Chlorantraniliprole	6.708	3.01	4.884
		(15.00)*	**(10.00)***	**(12.523)***
T_3	Cypermethrin	8.906	6.10	7.503
		(17.35)*	**(14.29)***	**(15.831)***
T_4	Spinosad	7.681	4.9	6.295
		(16.08)*	**(12.76)***	**(14.434)***
T_5	Indoxacarb	8.251	5.27	6.765
		(16.68)*	**(13.26)***	**(14.982)***
T_6	Fipronil	9.539	8.45	9.025
		(18.031)*	**(16.90)***	**(17.479)***
T_7	Imidacloprid	9.936	8.51	9.223
		(18.35)*	**(16.96)***	**(17.663)***
Overall Mean		**9.82**	**9.52**	**9.672**
F- test		S	S	S
S. Ed. (±)		1.570	0.852	4.776
C. D. (P = 0.05)		3.723	2.015	11.293

*Figures in parenthesis are arc sin transformed value

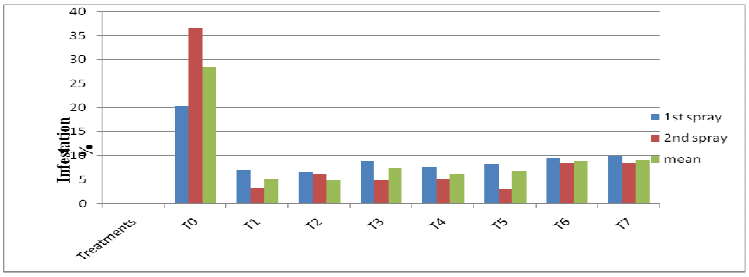

Figure 1: Efficacy of Certain Chemical Insecticides against Shoot and Fruit Borer on Shoot

Table 2: Efficacy of Certain Chemical Insecticides against Shoot and Fruit Borer (on Fruit)

Treatments		1st Spray	IInd Spray	IIIrd Spray	Overall Mean
T_0	Untreated/water spray	15.593	22.883	30.253	22.906
		(23.170)*	**(28.56)***	**(33.36)***	**(28.409)***
T_1	Flubendiamide	6.111	5.179	4.265	5.185
		(14.299)*	**(14.167)***	**(11.876)***	**(13.122)***
T_2	Chlorantraniliprole	5.344	4.823	3.988	4.713
		(13.305)*	**(12.884)***	**(11.475)***	**(12.529)***
T_3	Cypermethrin	8.69	8.151	6.739	7.860
		(17.129)*	**(16.535)***	**(14.788)***	**(16.258)***
T_4	Spinosad	6.983	6.381	6.55	6.603
		(15.211)*	**(14.574)***	**(13.592)***	**(14.880)***
T_5	Indoxacarb	8.563	7.148	6.44	7.423
		(16.903)*	**(15.43)***	**(14.463)***	**(15.786)***
T_6	Fipronil	10.835	9.368	7.323	9.173
		(19.165)*	**(17.787)***	**(15.457)***	**(17.584)***
T_7	Imidacloprid	11.021	9.963	7.945	9.643
		(19.329)*	**918.3350***	**(16.055)***	**(18.054)***
Overall Mean		**9.142**	**9.237**	**9.061**	9.188
F- test		S	S	S	S
S. Ed. (±)		0.692	0.483	0.851	2.442
C. D. (P = 0.05)		1.674	1.146	2.466	5.249

*Figures in parenthesis are arc sin transformed values

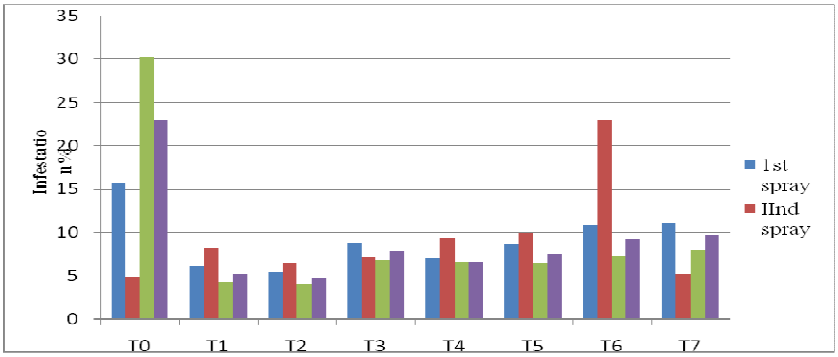

Figure 2: Efficacy of Certain Chemical Insecticides against Shoot and Fruit Borer on Fruit (on Fruit)

Treatments

Three sprays revealed that Anthranilic Diamide i.e. chlorantraniliprole 20SC @ 0.006% was found to be more effective than other chemical insecticides. Flubendiamide 39.35SC @ 0.01% and spinosad 45 SC@ 0.005% were at par with the chlorantraniliprole. Treatments like indoxacarb 14.5 SC @ 0.01%, cypermethrin 25 EC @ 0.006 % and fipronil

0.005% were par with each other and followed next effective treatments. Imidacloprid recorded least effective among the chemical treatments but significant and superior over control

Maximum returns were obtained in Chlorantraniliprole 20SC @ 0.006% followed by Flubendiamide 39.35SC @ 0.01and Spinosad 45 SC @ 0.005% respectively.

CONCLUSIONS

From the critical analysis of the present findings it can be concluded that insecticides like Chlorantraniliprole 20SC followed by Flubendiamide 39.35SC and Spinosad 45 SC were showing good result against *Leucinodes orbonalis* and can be used as a part of integrated pest management and effective tool under chemical control.

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